Fish

Documented Fish Species

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Introduction and Background

The National Park Service Water Resources Division conducted a single day of sampling in spring 2006 to document fish species present in Sand Creek Massacre National Historic Site (NHS). The team sampled several small, open ponds along the Big Sandy Creek, an intermittent stream, and one of its tributaries. The National Park Service was particularly interested in investigating the presence of the Arkansas darter (*Etheostoma cragini*), a threatened species listed by the State of Colorado and a candidate for federal protection under the Endangered Species Act.

The Arkansas darter, a three-inch cousin of the walleye (*Sander vitreus*) and yellow perch (*Perca flavescens*), occurs in isolated colonies within specialized habitat and is susceptible to local extinction by drought, ground water loss, and development. The species prefers small, permanent flowing springs and is usually associated with aquatic vegetation but has also been documented away from springs in several muddy streams. This adaptation may allow the species to survive droughts. Suitable habitat in Sand Creek Massacre NHS, is supported by Big Sandy Creek and a small tributary, several small ponds, and perennial streams. A major population of the Arkansas darter was documented during the 1980s in Big Sandy Creek beyond the boundaries of Sand Creek Massacre NHS and it appeared to be reasonable that the species may occur within the park.

Methods

Researchers sampled for fish at five locations, including pools, ponds, and areas along Big Sandy Creek and its tributaries where there was sufficient surface water for sampling gear to be used. The team conducted sampling with 25-foot (8-meters) beach seines or large vertical fishnets that float at the top and are weighted at the bottom with rigid pole supports at each end, a backpack electrofisher used to temporarily stun fish, and handheld dip nets. The beach seine and electrofisher were used where sufficient open water was present and dip nets were used in areas of dense aquatic vegetation. Electrofishing was conducted along shoreline habitats and areas accessible by wading. A dip-netter accompanied the electrofisher to collect any visible stunned fish. All captured fish were identified and either immediately released or collected as a voucher specimen to validate the identification. This process was repeated until sampling in all of the water or a representative sample was conducted.

PROJECT SUMMARY

NPS PHOTO

The team recorded water quality data, including conductivity, temperature, and salinity. The approximate area of open water (average length and width) and maximum pool depth were documented.

Results

Big Sandy Creek is an intermittent stream and had no running surface water at the time of the survey. A few pools of open water were present upstream of where a small spring-fed creek joins Big Sandy Creek. Most of the flow of Big Sandy Creek is subterranean except during heavy rainfall events or where the surface features allow a permanent surface flow over short distances. These conditions appear to be typical for Big Sandy Creek. Sampling was conducted wherever sufficient surface water was available.

Site One. This site, a soft, muddy- and sandy-bottom pool, is north of the future visitor center location and upstream of the junction of the spring-fed creek and Big Sandy Creek. There was a significant amount of streaming green filamentous algae in the pool. Researchers noted that the site may have been excavated at one time to provide water for cattle. Sampling methods were seining and electrofishing. No fish were

captured or observed, though there was a high abundance of aquatic insects, low in diversity. A species of small mollusk observed in pool and seemed fairly abundant.

Site Two. This site is located in Big Sandy Creek, upstream of Site One and is surrounded by a stand of cottonwoods. The pool had very little "open" water, was drying, and was chocked with Russian thistle (*Salsola* sp.) and aquatic vegetation. The site is also subject to pressure from deer browsing. The pool was approximately 65 feet (20 meters) long by 35 feet (11 meters) wide. The bottom was soft and nutrient loading was very high. Water clarity was moderate to poor water clarity. Approximately 90% of the water surface was covered by aquatic vegetation or displaced terrestrial vegetation. Surveys consisted only of dip netting and no fish were caught or observed.

Site Three. Site Three consisted of a large, shallow pool of open water fed continuously by a small flow from the spring-fed creek. The site is located at the junction of the spring-fed creek and main stem of Big Sandy Creek in the open prairie. The site is also located downstream of an early 1900s breach in a levee along Big Sandy Creek. Water clarity was moderately good and bottom sediments were somewhat firm. Sampling methods were seining and electrofishing, though no fish were caught or observed.

Site Four. Located above the junction of the spring-fed creek and Big Sandy Creek, this site was at least three feet deep (one meter) and approximately 175 feet (53 meters) long and 25 feet wide (8 meters). The size and depth of this pool suggest it seldom, if ever, dries out. There were relatively steep sloping banks on two sides of the pool. The pool was filled with aquatic vegetation covered with displaced terrestrial tumble weed. The only areas that could be sampled were from the outer edges of the pool were fish could easily escape sampling by moving to deeper areas choked with aquatic vegetation. A high abundance of fish were observed and captured, though they were only of one species, the Plains killifish (*Fundulus zebrinus*). Sampling equipment was insufficient for the dense vegetation in the deeper portions of the pool, where it is possible other species were present. Species diversity seemed to be limited in the shallower open portions of the pool.

DRAWING BY JOE TOMELLER

The Plains killifish (*Fundulus zebrinus*) was the only species recorded during this project.

NPS PHOTO

Electrofishing on Spring Creek at Sand Creek Massacre NHS.

Site Five. Located in the southern edge of Sand Creek Massacre NHS on Big Sandy Creek, this was the largest and deepest open water site—approximately 60 feet (18 meters) in diameter. The pool appears to be perennial. Maximum depth may exceed five feet (1.5 meters). The site appears to have been excavated, at least periodically, to provide water for fire trucks. The pool did not contain a large amount of aquatic or displaced terrestrial vegetation within the water column. Water clarity was good. Limited access to open water areas restricted sampling to the electrofisher. No fish were captured or observed.

Discussion

The overall sampling results were discouraging with only one species—the Plains killifish— recorded at one location. It is not clear why there were limited results, especially as two of the pools appeared to be perennial and had a continuous water connection to the site on the spring-fed creek which contained fish. These results are probably not truly representative of the actual extent of fish species in Sand Creek Massacre NHS.

It is possible that fish occupy only spring-fed areas where temperatures remain above freezing in the winter and move to other pools in warmer months. The team recommended additional sampling during the summer to better determine the extent and diversity of fish species in the park, confirm the lack of fish in sites sampled, and determine whether the Arkansas darter or other species are present at that time of year. Additional sampling is planned for the future.

Literature Cited

Tilmant, J., D. Vana-Miller, and K. Noon. 2006. Trip Report, Sand Creek Massacre National Historic Site, March 14, 2006. Memorandum, National Park Service, Water Resources Division, Denver, CO.

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